REMARKS/ARGUMENTS

Claims 1, 4-7, 10-14, 20, and 21 are pending. Claims 1, 7, 11, 14, 20, and 21 have been amended.

The Examiner rejected claims 1, 4-5, 7, and 10 under 35 U.S.C. 103(a) as being unpatentable over Hung et al. (US 6,387,287 B1).

Claims 1 and 7 have been amended to recite that selectively etching the layer of organosilicate glass with respect to the etch stop layer. Although Hung teaches etching through an organosilicate glass by teaching etching through a TEOS oxide ARC using a C4F8, CF4 and Ar etchant, Hung does not disclose or make obvious selectively etching a feature in an organosilicate glass layer using an etchant gas mixture of C4F8, CH2F2, oxygen, and CF4, as recited in claims 1 and 7, as amended.

Although col. 17, lines 20-35, of Hung teaches that CH2F2 and O2 are useful for providing greater nitride selectivity, this improved nitride selectivity is for the BPSG etch. Nothing in Hung discloses or suggests adding CH2F2 and O2 to an etch chemistry for OSG. **Nothing in Hung et al. suggests that the addition of CH2F2 and oxygen of the etch chemistry for TEOS, would provide a greater organosilicate glass to nitride selectivity, which is the motivation cited by the Examiner.** Nothing in Hung discloses or suggests adding CH2F2 and O2 to an etch chemistry for OSG. Instead, Hung shows in col. 16 in Table 10, that organosilicate glass has different etch properties than other oxides such as BPSG. This is shown by Table 10, in that different etchants are required for etching OSG than other oxides such as BPSG. **In addition, Hung in Table 10 teaches away from providing O2 for the OSG etch.** Table 10, specifically shows that O2 is used in the main etch but is not added to an etch for the OSG. Although Hung teaches the use of CH2F2, O2, and Ar for electively etching BPSG with respect to nitride, since Table 10 of Hung shows that the etching of OSG uses a different recipe than the etching of BPSG, it would not be obvious to use CH2F2 and O2 for etching OSG. The Examiner has not provided any evidence that these chemistries would be useful in etching an OSG. Table 10 of Hung teaches that instead different chemistries are used in etching OSG than a silicon oxide.

Col. 15, lines 1-3, of Hung states that step 86 disclosing a CH2F2, O2, and Ar etch is a nitride etch. It is not obvious to use the nitride etch of CH2F2, O2, and Ar shown in step 86 FIG. 11 of Hung et al. for selectively etching OSG. Organosilicate glass and nitride etch differently when exposed to an etch chemistry. Just because a chemistry may be successful for selectively etching a nitride does not mean that the same chemistry would be successful for selectively etching an organosilicate glass.

The Examiner stated that OSG is an oxide and such selectivity would have been expected as suggested by Hung et al. Table 10 of Hung shows the differences in etching characteristics between OSG (ARC Open) and BPSG (Main Etch). Etching these two different materials requires two very different etch recipes. Since different recipes are required to etch these different materials, it would not be obvious that a recipe that provides nitride selectivity for BPSG, as described in col. 17, lines 28-35, of Hung, would also provide etch selectivity for OSG.

The Examiner further stated that features that the applicant relies on in the argument (i.e. selectivity between nitride and OSG) are not recited in the claims. Claims 1 and 7 have been amended to recite selectively etching the OSG with respect an underlying etch stop layer.

The Examiner mentions that OSG is by its nature a dielectric. It is true that OSG is a dielectric, but different dielectrics have different etch properties. Since OSG relies on an organic component for a low-K, various etch chemistries that are useful for etching other dielectric materials that remove or destroy the organic component cannot be used. In addition, the organic component makes OSG have similar properties to photoresist polymer, making it more difficult to find a good etch chemistry that selectively etches OSG with respect to photoresist. All dielectrics do not have the same etch properties. Silicon nitride or titanium nitride would not have the same etch properties as OSG.

In addition, claim 7 has been amended to recited that the etch stop layer is a silicon carbide etch stop layer. Nothing in Hung suggests selectively etching OSG with respect to a silicon carbide etch stop layer. Since the etch stop is silicon carbide, the improvement of nitride corner selectivity is not desired.

For at least these reasons, claims 1 and 7 are not anticipated or made obvious by Hung.

Claims 4, 5, and 10 are ultimately dependent on claims 1 and 7, and are therefore respectfully submitted to be patentable over the art of record for at least the reasons set forth above with respect to claims 1 and 7. Additionally, these dependent claims require additional elements that, when taken in the context of the claimed invention, further patentably distinguish the art of record.

The Examiner rejected claims 6 and 11-13 under 35 U.S.C. 103(a) as being unpatentable over Hung as applied to claims 1-5, 7-10 above and further in view of Chiang et al. (US 5,739,579) and Wolf et al. (Volume 1, pp 556). Claims 6 and 11-13 are ultimately dependent on claims 1 or 7, and are therefore respectfully submitted to be patentable over the art of record for at least the reasons set forth above with respect to claims 1 and 7. Additionally, these dependent claims require additional elements that, when taken in the context of the claimed invention, further patentably distinguish the art of record. **For example, claim 11, as amended, further recite the stopping the flow of C4F8 and CH2F2 to selectively etch through the silicon carbide etch stop.** Although Wolfe et al. does disclose that a plasma etchant of CF4 and O2 may be used to etch Si3N4, Wolfe et al. does not suggest or make obvious that such a plasma etchant would successfully silicon carbide. Claim 13 further recites etching through a second OSG layer. For at least these reasons, claims 6 and 11-13 are not made obvious by the cited references.

The Examiner rejected claim 14, 20, and 21 under 35 U.S.C. 103(a) as being unpatentable over Hung et al., Chang, and Wolf et al. as applied to claims 1-13 above in view of Li et al. (US 6,284,149 B1). Claim 14 and claim 20 are ultimately dependent on claim 7, and claim 21 is dependent on claim 6, and are therefore respectfully submitted to be patentable over the art of record for at least the reasons set forth above with respect to claims 6 and 7. Additionally, these dependent claims require additional elements of stripping after etching through either the etch stop of second OSG layer, which when taken in the context of the claimed invention, further patentably distinguish the art of record. **In addition, claims 14, 20, and 21 have been amended to further recite that the photoresist mask is above a layer of organosilicate glass and that the photoresist mask is used to pattern the layer of organosilicate glass.** Li teaches a stripping process that is used for the main etch, since the step of Li etches and strips at the same time. In addition, col. 18, lines 64-65, of Li teaches that the chemistry of second step is to mainly etch remaining BCB or a small amount of photoresist. Therefore, Li, teaches stripping the photoresist with the chemistry of the first step. Therefore, Li

does not teach or suggest a stripping done after the main etch with the recited chemistry. In addition, none of the cited references teach that the chemistry recited in claims 14, 20, and 21 would successfully selectively remove photoresist from OSG. If such an etch chemistry would mainly etch BCB and strip some photoresist, such an etch may also mainly etch OSG, which is not desirable. For at least these reasons, claims 14, 20, and 21 are not made obvious by the cited references.

In the Examiner's Response to Arguments, the Examiner stated that Chiang, col. 15, lines 25-33, suggests that BSPG and OSG are equivalent alternatives. The applicant did not see this in the cited passage.

The Examiner further stated in the Response to Arguments that the applicant chose to ignore col. 17, lines 25-35, of Hung that teaches adding O2 and CH2F2 to the gas etchant of silicate glass dielectrics. That passage teaches adding O2 and CH2F2 to an etch for BPSG, as shown in Table 10, O2 is in the etch for BPSG. However, O2 is not added for the ARC open for etching TEOS. The Examiner stated that the listed gases are known to etch OSG. The applicant respectfully requests that the Examiner list which gases are known to etch OSG and then point out where in Hung et al. that it teaches such a list of gas for etching OSG. The applicant observed the list in Table 10 for etching TEOS, but that does not appear to be the list suggested by the Examiner.

In view of the above, it is respectfully submitted that the application is in a condition for allowance and action to that effect is respectfully requested at an early date. If the Examiner feels that a telephone conference would expedite allowance of this application, the Examiner is invited to call the undersigned at (831) 655-2300.

The Commissioner is authorized to charge any fees that may be due to our Deposit Account No. 50-0388 (Order No. LAM1P154).

Respectfully submitted,
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